High energy prices and a growing recognition of the intrinsic value provided by a clean environment have resulted in businesses and consumers going "green" to minimize environmental damage and reduce energy costs. Many Montana businesses have started to advertise their products and services as green and to promote their sustainable business practices in response to the change in consumer demand. Other businesses are revamping production processes or making energy efficient improvements to their buildings and property to cut energy costs and save money. The movement towards more sustainable production and reducing energy use has changed the way that Montanans do business, and it has resulted in businesses hiring more workers whose job duties are connected to conservation and environmental protection. Jobs where the work activity also provides environmental benefits have been termed "green jobs." Common examples of green jobs are environmental engineers or workers that produce renewable energy.

The green movement is unlikely to be a passing fad. With a limited supply and an ever-expanding demand for energy and natural resources, the cost of these resources will continue to increase. Consumers will continue to demand green products, and businesses will continue to look for ways to reduce energy costs and eliminate waste in order to increase profits. In recognition of the impact of the green movement on the economy and workforce, economists and workforce training professionals are now trying to identify and measure the number of green jobs and to determine whether Montana workers have the skills necessary to fulfill their green job duties.

The Definition of Green Jobs:

Broadly defined, green jobs are jobs where the work activity aids in environmental protection, renewable energy generation, conservation, or restoration. Green jobs are not necessarily new jobs added to the economy, but may be old jobs that have adopted environmentally-friendly practices in response to rising energy costs and a growing recognition of the importance of the environment in our economy. In this sense, green jobs are not a new phenomenon, but another chapter of the ever-developing process to make production more efficient, to reduce costs, and to eliminate unnecessary waste.

Although the general concept of green jobs is understood, the definition of green jobs remains stubbornly nebulous in the specifics. Many green jobs can only be considered green in relation to other practices or products. For example, the coal industry conducts research and makes infrastructure improvements to improve the efficiency of coal power and reduce carbon emissions. Coal could be considered green in comparison to the production of coal-powered energy in the past. Yet, coal-powered energy is not considered green because there are cleaner renewable alternatives. As new technologies are developed, the definition of green jobs will change.

Green jobs cut across the boundaries of industries and occupations. There are some industries that are considered green – such as wind powered energy – that lay fully within the green jobs sphere. Yet, even within a green industry, there are payroll clerks, accountants, janitors, and others that do not perform tasks that directly impact the environment. These workers may be considered green to the extent that they work in green industries, but are not green with respect to job duties.

In order to count the green jobs in Montana, a standard definition was adopted. Figure 1 provides the detailed definition. There are two important aspects to the definition. First, the definition is focused on the green work activity at the job level, not on the greenness of the industry. For example, an environmental engineer that prevented oil spills in the oil and gas industry could be considered green because the work effort reduced pollution and mitigated waste, even though the oil and gas industry is not considered green.

Figure 1: Definition of Green Jobs

A green job is one in which an employee produces a product or service that improves energy efficiency, expands the use of renewable energy, and/or supports environmental sustainability.

Six distinct areas were defined:

- **Pollution, waste, and greenhouse gas management, prevention, and reduction**
- **Energy efficiency and conservation**
- **Environmental cleanup and restoration, and waste cleanup and mitigation**
- **Renewable energy and alternative fuels**
- **Education, regulation, compliance, public awareness, training, and energy trading**
- **Sustainable agriculture and natural resource conservation**

Second, the green work activity needs to be related to the production of a good or service, not incidental to the job. Recycling office paper or riding a bike to work are personal choices designed to reduce an individual's environmental impact, but these activities are not related to the employee's work effort that produces the good or service provided by the business. However, an office manager who organized the office's recycling efforts or coordinated office carpools as a part of their paid job duties would be considered green because the green activity is a part of their primary work effort. In other words, the worker must get paid for doing the green work activity.

Green Jobs in Montana

The Montana Department of Labor and Industry recently completed a project to determine the number of green jobs in Montana and across five other partnering states. The goal of the project was to determine whether a green job required more specialized training or additional knowledge than a traditional job. If so, education and training programs could be developed that would help Montana's workers be prepared for future green jobs. The research found that 4.5% of Montana's jobs are green jobs, which is slightly higher than the rate found in Utah, Nebraska, and South Dakota, but lower than the rate found in Iowa and Wyoming.

The research found that over 4.5% of Montana's payroll jobs are green based on a survey mailed to over 8,000 Montana business establishments. Over 4,700 Montana businesses filled out the survey, with usable surveys representing 49.2% of the mailed surveys. About 19,000 Montana jobs are considered green, which makes the number of green jobs similar in size as the Administrative and Waste Services Sector.

However, the green sector is not a separate industry of the economy, but cuts across all industries. Green jobs exist in every industry, with Construction and Public Administration having the largest number of green jobs. The highest concentration of green jobs occurs in the Agriculture, Forestry, Fishing, and Hunting industry. This industry depends on the health of Montana's natural resources for long-term profitability, and therefore has a greater incentive to participate in the conservation and preservation of the environment. Figure 2 shows the industries with the largest number of green jobs.

Figure 2: Montana Green Jobs by Industry

Industry	Number of Green Jobs	% of Industry Jobs that are Green
Construction	3,996	15.9%
Public Administration	2,612	6.5%
Professional and Technical Services	2,496	13.3%
Manufacturing	1,241	7.7%
Administrative and Waste Services	1,079	5.7%
Agriculture, Forestry, Fishing, and Hunting	1,043	23.5%
Other Services, except Public Administration	783	5.1%
All other Industries	5,856	

Workers in green jobs do not spend all of their time in green activities – most green jobs only require a portion of time to be dedicated to green activities. For example, a plumber may spend a portion of work time installing energy efficient heat-

Figure 3: Percent of Time Dedicated to Green Activities

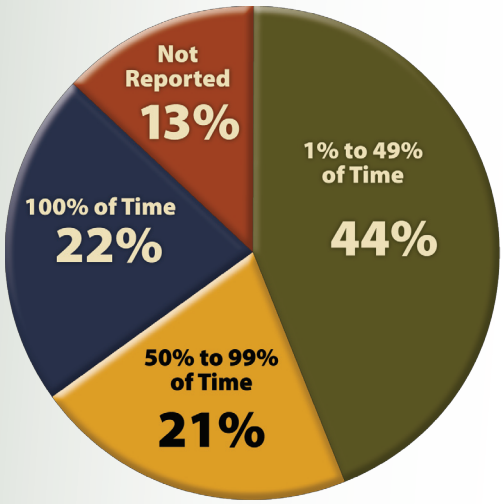
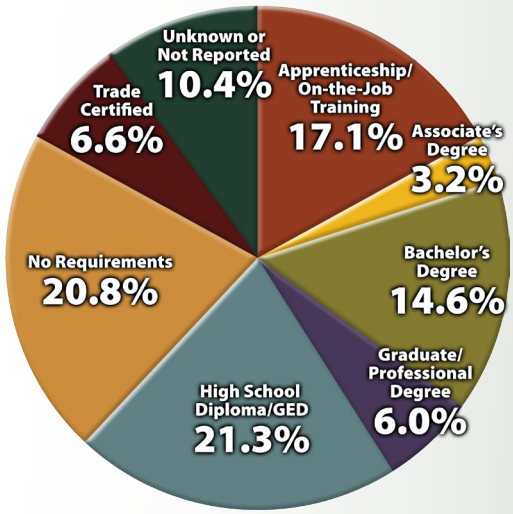


Figure 4: Educational Requirements of Green Jobs in Montana



ing systems, but spends the majority of time installing conventional technologies. Most green jobs (44%) report that green activities comprise less than 50% of the work time. Approximately 22% of green jobs require workers to spend all of their work time in green activities. (Figure 3)

One of the primary goals of the survey research was to determine whether Montana's workforce has the education and training needed to fulfill the duties required of green workers. In terms of education requirements, green jobs do not require more education than all Montana jobs. Figure 4 illustrates the educational requirements of green jobs in Montana. Of the green jobs where the education was reported, 27% require a post-secondary education level of an associate's degree or higher, which is a proportion similar to all Montana jobs. The remainder may require work experience, apprenticeships, or trade certification, but do not require a degree past high school. However, green jobs are more likely to require a graduate or professional degree. According to data for the 2009 Occupational Employment Statistics, approximately 2% of Montana jobs require a graduate or professional degree; while 6% of green jobs require this level of education.

Businesses were also asked if any special certifications or licenses were required for green jobs. Approximately 14% of green jobs required some sort of certification or licensure. The reported licenses and certifications included ones commonly associated with green jobs, such as Leadership in Energy and Environmental Design (LEED), Occupational Safety and Health Administration (OSHA), Heating, Ventilation, and Air Conditioning (HVAC), hazardous material (HAZMAT), and Environmental Protection Agency (EPA) certifications. In addition, the reported licenses and certificates also included some general certifications that are required for both green and non-green workers in a certain occupation, such as pesticide application, professional engineer license, electrician's license, commercial driver's license, or other permits required by the state in order to conduct business in a profession.

Small businesses are more likely to have green employment. Figure 5 shows the number and percentage of green jobs by the size class of the employer. Small businesses with less than ten employees had the most number of green jobs, with 7,751 green jobs or about 8.5% of all Montana jobs in businesses with less than ten employees. Large employers, or those with 50 or more employees, reported only about 3% of their jobs as green. However, these businesses hire a large number of employees, so the number of green jobs among large employers is still sizeable.

Figure 5: Montana Green Jobs by Size of Employers

Number of Employees Hired by Business	Number of Green Jobs	% of Jobs that are Green
.5 to < 10 employees	7,751	8.5%
10 to < 50 employees	5,939	4.1%
50 and More Employees	5,417	2.9%

Workers interested in making a positive environmental impact in their occupations will be pleased to know that green jobs are projected to grow by 100 jobs per year through 2012, then 260 jobs per year through 2020. Workers will also be needed to replace people that retire or move to other jobs. Including replacement needs, the total number of green jobs openings each year is expected to exceed 500. At this rate of growth, green jobs are expected to grow slightly faster than all jobs in Montana for the next ten years. Green jobs are expected to grow at 1.1% per year, while all jobs are expected to grow at 0.9% per year. However, the higher growth rate is likely because green jobs are concentrated in industries and occupations that are expected to recover from the recession more quickly than other industries, not necessarily because the jobs are green. The fifteen occupations with the most growth in green jobs are shown Figure 6.

With a limited supply and an ever-increasing demand for energy and natural resources, both businesses and consumers will continue to look for ways for our economy to be more efficient and more green. Sustainable practices cannot be implemented without a properly trained workforce. With the research reviewed in this article, the Montana Department of Labor and Industry generated a baseline to evaluate our green workforce and to ensure that our economy has the workers necessary to compete in the global marketplace. More information on green jobs in Montana and in the five other partnering states, as well as other research included in the project, is available at www.researchingthegreeneconomy.com.

Figure 6. Green Occupations with the Largest Projected Job Growth, 2010 to 2020

	Occupation	Training Required	2010 Average Annual Wage	Green Job Growth 2010 to 2020	Percent of Time Spent in Green Activities
1	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Postsecondary vocational training	$38,510	228	More than 50%
2	Electricians	Long-term OJT	50,463	124	Less than 50%
3	Landscaping and Groundskeeping Workers	Short-term OJT	25,023	82	More than 50%
4	Insulation Workers, Floor, Ceiling, and Wall	Moderate OJT	32,668	68	*
5	Water and Liquid Waste Treatment Plant and System Operators	Long-term OJT	32,771	68	More than 50%
6	Construction Laborers	Moderate OJT	35,487	66	Less than 50%
7	Production Workers, All Other	Moderate OJT	23,636	65	See note.
8	Plumbers, Pipefitters, and Steamfitters	Long-term OJT	51,299	59	*
9	Refuse and Recyclable Material Collectors	Short-term OJT	31,427	58	100%
10	First-Line Supervisors/Managers of Construction Trades and Extraction Workers	Work Experience	53,417	52	Less than 50%
11	Hazardous Materials Removal Workers	Moderate OJT	31,496	48	*
12	Installation, Maintenance, and Repair Workers, All Other	Moderate OJT	33,836	48	*
13	Civil Engineers	Bachelor's degree	65,368	43	Less than 50%
14	Glaziers	Long-term OJT	32,600	40	*
15	Carpenters	Long-term OJT	35,638	37	Less than 50%

Note: Production workers were either reported as spending less than half of their time on green activities, or spending 100% of their time on green activities.
**Estimates not significant at the 95% confidence level.*